

ABSTRACT OF THE DISCLOSURE

The present invention relates to a method and device for etching a silicon substrate that can keep surface unevenness of a structured surface formed by etching to within a fixed value. After an etching mask is formed on its surface, a silicon substrate S is mounted on a base 3 in an etching device 1. An etching gas (SF₆) and a protective film forming gas (C₄F₈) are supplied to a chamber 2. The SF₆ gas and the C₄F₈ gas supplied to the chamber 2 are converted to plasma using a coil 16 to which high-frequency electrical power is applied. For example, by supplying a large amount of SF₆ gas while high-frequency electrical power is applied to the base 3, dry etching primarily at the etching grounds is advanced. Conversely, by supplying a large amount of C₄F₈ gas, protective film formation primarily to the etching structured surfaces is advanced. By repeating these steps, deep grooves with smooth structured surfaces can be formed.